IN THE CLAIMS

~~(Method in device that originates location request message)~~

1. (Original) In a location requesting device, a method for obtaining location information related to a target device, the method comprising the steps of:

transmitting a location request message onto a network towards the target device, the location request message requesting location information in relation to the target device;

receiving a location signature message, the location signature message containing location information associated with a plurality of different location information services, each location information service providing location information having a different location granularity in relation to the target device; and

processing the location information for at least one of the location information services in the location signature message to derive a location of the target device in relation to at least one desired location granularity.

~~(LRM)~~

2. (Original) The method of claim 1 wherein the location request message contains a specification of location information parameters that identify different types of location information requested by the location request message, each different type of location information corresponding to location information that can be provided from a different location information service.

~~(request includes time to return)~~

3. (Original) The method of claim 2 wherein the location request message contains a target device identifier and contains a time to return identifier, and wherein the step of transmitting the location request message comprises the steps of:

configuring the specification of location information parameters in the location request message to include a specification of a location information parameter for each type of location information that is to be returned in the location signature message from a corresponding location information service;

calculating a value for the time to return identifier based upon a propagation distance between the location requesting device and the target device, the value for the time to return identifier indicating a metric that determines how close the location request message is propagated in the network towards the target device before a node in the network that receives the location request message cancels propagation of the location request message and produces a location signature message that is returned to the location requesting device; and

forwarding the location request message onto the network towards the target device specified by the target device identifier.

~~(time to return reaches target)~~

4. (Original) The method of claim 3 wherein the step of calculating a value for the time to return identifier comprises the steps of:

setting the value of the time to return identifier to a total of the propagation distance between the location requesting device and the target device, such that the step of transmitting the location request message onto the network towards the target device causes nodes in the network to propagate the location request message to the target device, and such that the target device creates a location signature message for return to the location requesting device.

~~(time to return does not reach target)~~

5. (Original) The method of claim 3 wherein the step of calculating a value for the time to return identifier comprises the steps of:

setting the value of the time to return identifier to be less than a total of the propagation distance between the location requesting device and the target

device, such that the step of transmitting the location request message onto the network towards the target device causes nodes in the network to propagate the location request message a distance less than required to reach the target device, and such that a node in the network other than the target device creates a location signature message for return to the location requesting device.

6. (Original) The method of claim 3 wherein the step of configuring the specification of location information parameters comprises the step of:

setting a location information parameter for each type of location information that is to be returned, in the location signature message, from a corresponding location information service that is accessible to each node in the network, such that each node in the network that is capable of producing a location signature message containing location information for that location parameter provides such location information in a location signature message in response to receiving the location request message.

~~(fuzz factor in location request message)~~

7. (Original) The method of claim 6 wherein the location request message includes at least one modification factor corresponding to at least one location parameter in the specification of location information parameters, and wherein the step of configuring the specification of location information parameters comprises the step of:

setting the at least one modification factor corresponding to the at least one location parameter to a value by which a node in the network, that provides location information corresponding to that location parameter in the location signature message, is to modify that location information.

~~(fuzz factor applied to location info. in location signature message)~~

8. (Original) The method of claim 7 wherein the step of receiving a location signature message comprises the step of:

receiving a location signature message that includes location information that is modified according to the at least one modification factor corresponding to the at least one location parameter associated with that location information.

~~(LOCATION SIGNATURE MESSAGE has loc. Info from diff. nodes)~~

9. (Original) The method of claim 1 wherein the location signature message contains location information inserted into the location signature message from a plurality of different nodes in a communications network, each node having a different location proximity to the target device.

10. (Original) The method of claim 9 wherein the location information inserted into the location signature message is location information obtained from each node:

i) at which the location request message is received on a network path from the location requesting device to the target device;

ii) which is capable of responding to the location request message with a location signature message; and

iii) for which location information is accessible by that node from a respective location information service that corresponds to a respective location information parameter specified in the location request message.

~~(how LSM is processed)~~

11. (Original) The method of claim 1 wherein the step of processing comprises the steps of:

retrieving, from the location signature message, first location information having a first location granularity in relation to the target device;

retrieving, from the location signature message, second location information having a second location granularity in relation to the target device;

analyzing the first location information and the second location information to determine a location of the target device based on the first and second location information.

12. (Original) The method of claim 1 wherein

the location request message includes a specification of location information parameters that identify location information that may be available from location information services to nodes in the network existing on a path between the location requesting device and the target device; and

wherein the location signature message contains location information corresponding to respective location parameters that have a value indicating that the location requesting device is requesting that location information and for which nodes in the network existing on the path between the location requesting device and the target device are capable of access the location information from a location information service corresponding to the respective location parameters.

13. (Original) The method of claim 12 wherein the different portions of location information corresponding to different location information services provide different location granularities with respect to the location of the target device, the different location granularities including at least one of postal location information, phone number information, global positioning information, and network location information.

~~(Method in node in network that processes location request messages and location signature messages)~~

14. (Original) In a node in a computer network, a method for providing location information, the method comprising the steps of:

detecting a requirement to provide location information on behalf of a location requesting device;

in response to the step of detecting, creating a location signature message, the location signature message containing location information associated with a plurality of location information services accessible to the node, each location information service providing location information having a different location granularity in relation to a target device; and

forwarding the location signature message onto the network to a location signature message destination.

~~(requirement = lrm)~~

15. (Original) The method of claim 14 wherein the step of detecting the requirement to provide location information comprises the step of:

receiving, on the network, a location request message containing a specification of location information parameters that identify different types of location information, that can be provided from different location information services, and which, if accessible to the node, are to be inserted into a location signature message for forwarding onto the network to the location signature message destination.

~~(time to return in location request message)~~

16. (Original) The method of claim 15 wherein the location request message contains a target device identifier and contains a time to return identifier and wherein the step of receiving a location request message comprises the steps of:

adjusting a value of the time to return identifier in the location request message;

determining if the value of the time to return identifier indicates that the location request message has propagated on the network far enough towards the target device; and

if the value of the time to return identifier indicates that the location request message has propagated on the network far enough towards the target

device, canceling propagation of the location request message towards the target device; and

if the value of the time to return identifier indicates that the location request message has not propagated on the network far enough towards the target device, forwarding the location request message onto the network towards the target device specified by the target device identifier.

~~(separate location signature message from each node)~~

17. (Original) The method of claim 15 wherein the step of receiving, on the network, a location request message comprises the steps of:

detecting that the location request message includes an indication that separate location signature messages are to be sent to the location signature message destination, and in response to the step of detecting, forwarding the location request message onto the network towards the target device specified by the target device identifier and proceeding to process the steps of creating a location signature message and forwarding the location signature message onto the network to a location signature message destination, such that the location signature message destination receives a separate location signature message from each node that detects a requirement to provide location information.

~~(requirement = lsm)~~

18. (Original) The method of claim 14 wherein the step of detecting the requirement to provide location information comprises the step of:

receiving a first location signature message, the first location signature message containing a specification of location information parameters that identify different types of location information, that can be provided from different location information services, and which, if accessible to the node, are to be inserted into the location signature message created in the step of creating for forwarding onto the network to the location signature message destination.

19. (Original) The method of claim 18 wherein the first location signature message includes first location information and wherein the step of creating a location signature message comprises the step of:

obtaining second location information from each accessible location information service specified by a location information parameter in the specification of location information parameters contained in the first location signature message;

combining the first location information from the first location signature message and the second location information into a second location signature message, such that the second location signature message contains location information in relation to the target device from the node and at least one previous node on a network path towards the location signature message destination.

20. (Original) The method of claim 14 wherein the step of creating a location signature message comprises the steps of:

obtaining location information relative to the node from each accessible location information service specified in a specification of location information parameters; and

inserting the location information from each accessible location information service into the location signature message.

21. (Original) The method of claim 20 wherein the step of inserting comprises the steps of:

placing an identity of the node into the location signature message in order to associate the location information obtained by the node for all location information services accessible to the node with the identity of the node.

22. (Original) The method of claim 20 wherein the location information obtained from each location information service corresponds to location information

obtained from those location information services that are accessible to the node for each respective location information parameter specified in a specification of location information parameters.

23. (Original) The method of claim 20 wherein the location information obtained from different location information services provides a different granularity of location with respect to the location of the node in relation to the target device.

24. (Original) The method of claim 20 wherein the step of inserting the location information into the location signature message comprises the steps of:

obtaining at least one location information modification factor that corresponds to at least one location information service specified in the specification of location information parameters; and

applying the at least one location information modification factor to corresponding location information obtained from the location information service in order to modify values of the location information from the location information service.

~~(node signature)~~

25. (Original) The method of claim 14 wherein the step of creating a location signature message comprises the steps of:

associating a node signature to the location information contained in the location signature message such that the identity of the node associated with the location information can be verified by a recipient of the location information.

26. (Original) The method of claim 14 wherein a destination of the location signature message is a location requesting device.

27. (Original) The method of claim 14 wherein a destination of the location signature message is a target device.

28. (Original) The method of claim 14 wherein a destination of the location signature message is a beacon device.

29. (Original) The method of claim 28 wherein the step of forwarding the location signature message onto the network to a location signature message destination comprises the steps of:

determining if the value of the time to return identifier indicates that a location signature message has propagated on the network far enough towards a beacon device; and

if the value of the time to return identifier indicates that the location signature message has propagated on the network far enough towards a beacon device, redirecting the location signature message towards a location information destination.

30. (Original) A location requesting device comprising:

at least one communications interface capable of being coupled to a network;

a memory;

a processor; and

an interconnection mechanism coupling the at least one communications interface, the memory and the processor;

wherein the memory is encoded with a location requesting application that when performed on the processor, produces a location requesting process that causes the data communications device to obtain location information by performing the operations of:

transmitting a location request message onto a network towards the target device, the location request message requesting location information in relation to the target device;

receiving a location signature message, the location signature message containing location information associated with a plurality of different location information services, each location information service providing location information having a different location granularity in relation to the target device; and

processing the location information for at least one of the location information services in the location signature message to derive a location of the target device in relation to at least one desired location granularity.

31. (Original) A data communications device comprising:

at least one communications interface capable of being coupled to a network;

a memory;

a processor; and

an interconnection mechanism coupling the at least one communications interface, the memory and the processor;

wherein the memory is encoded with a location manager application that when performed on the processor, produces a location manager process that causes the data communications device to provide location information by performing the operations of:

detecting a requirement to provide location information on behalf of a location requesting device;

in response to the step of detecting, creating a location signature message, the location signature message containing location information associated with a plurality of location information services accessible to the node, each location information service providing location information having a different location granularity in relation to a target device; and

forwarding the location signature message onto the network to a location signature message destination.

32. (Original) A computer program product having a computer-readable medium including computer program logic encoded thereon that, when performed on a computer system having a coupling of a memory, a processor, and at least one communications interface, provides a method for obtaining location information by performing the operations of:

transmitting a location request message onto a network towards the target device, the location request message requesting location information in relation to the target device;

receiving a location signature message, the location signature message containing location information associated with a plurality of different location information services, each location information service providing location information having a different location granularity in relation to the target device; and

processing the location information for at least one of the location information services in the location signature message to derive a location of the target device in relation to at least one desired location granularity.

33. (Original) A computer program product having a computer-readable medium including computer program logic encoded thereon that, when performed on a computer system having a coupling of a memory, a processor, and at least one communications interface, provides a method for providing location information by performing the operations of:

detecting a requirement to provide location information on behalf of a location requesting device;

in response to the step of detecting, creating a location signature message, the location signature message containing location information associated with a plurality of location information services accessible to the node, each location information service providing location information having a different location granularity in relation to a target device; and

forwarding the location signature message onto the network to a location signature message destination.

34. (Original) A location requesting device comprising:

at least one communications interface capable of being coupled to a network;

a memory;

a processor; and

an interconnection mechanism coupling the at least one communications interface, the memory and the processor;

wherein the memory is encoded with a location requesting application that when performed on the processor, produces a location requesting process that causes the data communications device to obtain location information by enabling a means including:

means for transmitting a location request message onto a network towards the target device, the location request message requesting location information in relation to the target device;

means for receiving a location signature message, the location signature message containing location information associated with a plurality of different location information services, each location information service providing location information having a different location granularity in relation to the target device; and

means for processing the location information for at least one of the location information services in the location signature message to derive a location of the target device in relation to at least one desired location granularity.

35. (Original) A data communications device comprising:

at least one communications interface capable of being coupled to a network;

a memory;

a processor; and

an interconnection mechanism coupling the at least one communications interface, the memory and the processor;

wherein the memory is encoded with a location manager application that when performed on the processor, produces a location manager process that causes the data communications device to provide location information by enabling a means including:

means for detecting a requirement to provide location information on behalf of a location requesting device;

in response to the means for detecting, means for creating a location signature message, the location signature message containing location information associated with a plurality of location information services accessible to the node, each location information service providing location information having a different location granularity in relation to a target device; and

means for forwarding the location signature message onto the network to a location signature message destination.